# Tsunami Inundation Maps

**Brian de Silva, Kellie MacPhee, Abe Engel, & Ben Liu**
University of Washington
Mathematics & Applied Mathematics

**Contact Information:**
bdesilva@uw.edu

**Abstract**

Numerical simulations conducted by researchers at the University of Washington are used to model and predict the impact of tsunamis. By estimating the probability of occurrence of each simulated tsunami, the probability of exceeding a given level of inundation (flooding) can be estimated for every point in the landscape, giving rise to a hazard map. Visualizing hazard maps is difficult for several reasons. First, the data has a large amount of uncertainty: the probability of each simulated event must be estimated, and the hazard maps are also generated from a limited pool of simulated events, thus they may not account for the worst or most exotic tsunamis. Second, the resultant hazard maps specify a complex hazard function at every point, which describes the probability of inundation at every depth. To effectively communicate the dangers and potential impacts of tsunamis to the general public, we employ interactive and research-driven design techniques to enhance users' understanding of the complex data. We display contour plots of inundation level for fixed probabilities, and allow the users to manipulate the probabilities to see how inundation changes over the landscape. We additionally use small multiples to present the user with an overview of the inundation from a sample of individual simulations, showing the possible variety of outcomes over separate events. Our hope is that by showing both the aggregate data and the data for individual simulations, we can reduce the level of abstraction in the uncertainty measures that are typically reported.

## Problem

A clear statement of the problem your project addresses.

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## Motivation

An explanation of why the problem is interesting and important.

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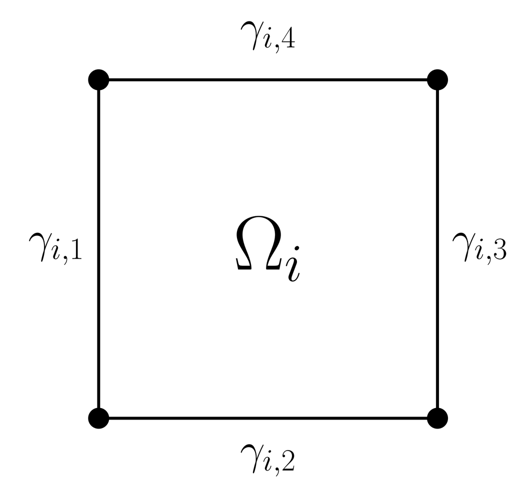


## Approach

### Transparency

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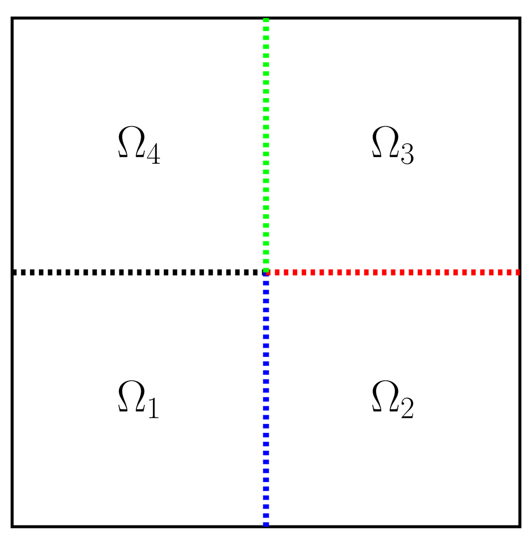
### Small multiples




### Moving boundaries

## Results

Screenshots and a working demo, and an indication of how they effectively address your problem.

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|---|---|---|---|---|
| $1/36$ | 25 | 0.12 | 0.02 | 25 |
| $1/72$ | 65 | 0.43 | 0.03 | 28 |
| $1/144$ | 240 | 1.86 | 0.03 | 31 |
| $1/288$ | 983 | 9.26 | 0.03 | 32 |

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## Future work?

- thing 1
- thing 2
- thing 3

## References

[1] Eduard Bader, Martin A Grepl, and Siegfried Müller. A static condensation reduced basis element approach for the reynolds lubrication equation. *Communications in Computational Physics*, 21(1):126–148, 2017.

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